UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

April 24, 2018

Michael Harris
Department of Special Services
Engineering and Environmental Services Division
187-A Old Churchmans Road
New Castle, DE 19720

Michael Sherrier
DuPont Corporate Remediation Group
974 Centre Road
Chestnut Run Plaza 730 (3255-6)
Wilmington, DE 19805

Re: EPA and DNREC Comments on Work Plan for Additional Investigation;
Army Creek Landfill, New Castle, Delaware

Dear Messrs. Harris and Sherrier:

EPA and DNREC have reviewed Ruth Associates, Inc.'s February 14, 2018 Work Plan for Additional Investigation at the Army Creek Landfill Site and its attachments, including Golder Associates' Sampling and Analysis Plan. Our comments are provided below and in the attached memorandum from Region III's Office of Analytical Services and Quality Assurance. Also attached are comments prepared by Ground Water Associates (GWA) and submitted to EPA by Artesian Water Company; EPA concurs with GWA's recommendations. Within 30 days, please submit a revised Work Plan addressing these comments and recommendations to EPA and DNREC for approval by EPA.

1. **Background:** The last paragraph discusses PFAS data in Attachment 2. A figure presenting the locations of the Attachment 2 sampling results should be include.

2. **Conceptual Site Model, Hydrogeology**: It is reported there that "the Site is located in the up-dip, feather-edge of the Potomac Formation and its stratigraphy is represented by proximal, stream-deposited sands, silts, clays and gravels accumulated in an estuarine, marginal marine basin, with highly variable lateral and vertical distribution of sand, silt, clay and gravel. Figure 3 provides the conceptual stratigraphic column described herein. The Columbia rests unconformably upon the upper portion of the UPA." The document continues with a description of the regional hydrogeology and current and historical aquifer use. However, it does not describe the Site-specific hydrogeology. Where is the

landfill located? On top of or within the Columbia Aquifer or the UPA? Is the UPCU present beneath or adjacent to the landfill or in the area between the landfill and the supply wells? What are the thicknesses of the stratigraphic zones of interest? What is the depth of the groundwater table? In what formation is it present? Additional information is needed for adequate description of the CSM with respect to contaminant impacts to the groundwater.

3. **Conceptual Site Model, Surface Water:** Since necessary information regarding the Site-specific hydrogeology was not provided, it is not clear how groundwater impacted by the landfill interacts with the surface water (e.g., is the Columbia present adjacent to or under the landfill?). The discussion states that UPA groundwater does not discharge to the Columbia Aquifer or surface water. The discussion should also address interaction between the Columbia Aquifer and surface water. The reference(s) that explore and demonstrate interaction between groundwater and surface water should be cited.

4. **Approaches and Methodologies, Western Lobe Study:** It is unclear why there are no wells in the upper or lower sands downgradient of the landfill in the area between wells P4 and 38 (in the eastern portion of the blue arrow indicating presumed flow towards the water supply wells). It is recommended that an additional well cluster is added in this area.

5. **Approaches and Methodologies, Western Lobe Study:** The monitoring program is summarized in Table 1, and the well locations and the general Western Lobe Study Area are shown in Figure 2. However, without understanding the stratigraphy, where the wells are screened and the lithology at the well location, it is difficult to evaluate the monitoring program. Please supply a table with this information.

6. **Approaches and Methodologies, Western Lobe Study Area, first bullet:** Artesian wells AWC-2, AWC-6R and AWC-7 are important data points at the south end of the study area as implied in the text of the Work Plan. However, the wells are not identified as sampling points in Table 1 and Figure 4. These wells should be sampled. If they will be sampled under another program (e.g., by Artesian), this information should be provided in the Work Plan, as well as a description of the sampling/analytical methods for the program and an assessment of the data comparability.

7. **Approaches and Methodologies, Western Lobe Study Area, second bullet:** Justification should be added explaining the decision not to analyze for VOCs and anions all four quarters.

8. **Approaches and Methodologies, Well Installation/Development:** The Work Plan states: “The wells will be…. installed through 8-inch diameter, steel isolation casing grouted into the UPCU (competent clay) which divides, where present, the Columbia Aquifer from the UPA. If the UPCU is absent, the isolation casing will be grouted into a lower conductivity portion of the UPCUTZ. The placement of the well screens will be determined in the field, based on: 1) observed volatile organic impact based on organic vapor (i.e., PID) readings (although unlikely) and/or 2) visual evidence of impacts. If there is no evidence of either, then the screen interval will be set across the portion of the UPA (either upper sand or lower sand) with the coarsest materials.” It is unclear how deep the wells will be drilled. The objective for the targeted screen interval is also unclear. Contamination is typically found in the less transmissive zones, rather than the most transmissive zone.

9. **Approaches and Methodologies, Surveying**: The first paragraph discusses survey discrepancies that exist between the ACL and the DS&G Sites. A table should be added to the Work Plan identifying the discrepancies to be assessed/corrected.

10. **Approaches and Methodologies, PFAS Source Evaluation:** It is stated that "an important consideration in the evaluation of PFAS in the gas vent liquids is that the analytical method for PFAS is a drinking water method not intended for use on other matrices such as leachate or wastewater." This statement is correct. However, commercial laboratories have analyzed non-drinking water matrices, including leachate, using Method 537, Revision 1.1 with modifications. Potential matrix interference can be mitigated by providing the laboratory with historical Site data, e.g., analytical results for the aqueous samples collected from the gas vents from 2004 to 2007. This information can be used by the laboratory to identify corrective measures or alternative techniques to reduce matrix interference during analysis of aqueous samples collected from gas vents. These samples could also be analyzed using the direct-inject method described in EPA Region 5's draft SOP (attached) for PFAS as an alternative to, or in addition to, analysis by Method 537. Region 5 has analyzed leachate samples from Superfund sites in Minnesota and Michigan using this method.

11. **Approaches and Methodologies, PFAS Source Evaluation:** It is recommended that Artesian's Midvale wells to the north and upgradient of ACL be included in this sampling effort.

12. **Reporting:** Please specify that PFAS results will be provided to EPA and DNREC in the EQuIS EDD format.

13. **Table 1:** Is monitoring well 38N the same well as 38 depicted on Figure 2? Please clarify.

14. **Table 1:** A note should be included in the table to indicate when, with respect to sample collection (before or after), water elevations will be measured for each quarterly monitoring event.

15. **Figures 2 and 4:** The gas vents are represented by an assortment of circles, ovals, rings and squares. The same symbol should be used to represent all of the gas vents and the symbol should match the corresponding symbol in the legend.

Attachment 4 – Sampling and Analysis Plan

16. **Section 4.2.1, Western Lobe:** This section states that wells with long screens will be purged and sampled from two locations to assess potential differences in concentrations across the upper and lower sand units. Regardless of where the pump is placed, the sample will be a flow-weighted average of the screen interval. It is not recommended that long screened wells be used to monitor a contaminant plume and they should not be sampled using low-flow techniques. Low-flow sampling protocols specifically state that the screen should be short (10 feet or less). It is recommended that the well network be carefully evaluated to determine where, if anywhere, low-flow sampling is appropriate and if the replacement of long-screened wells with well clusters would be appropriate. Wells screened across both the upper and lower sands of the UPA would be candidates for replacement.

17. **Section 4.2.1, Western Lobe:** If wells MW-38N and MW-49N are to be sampled, the pumping rate during purging should be slightly less than the yield of the well. After one well volume has been

removed, stabilization of field parameters should be monitored while continuing to purge up to three well volumes. One flow-weighted average sample should be collected from each of these wells.

18. **Section 4.2.1, Western Lobe:** This section states that all analyses will be performed during each sampling quarter which is inconsistent with the Work Plan. Please review and revise as necessary.

19. **Section 4.2.1, Western Lobe:** The water level measurement activity is not detailed in the text and Table 1 states only that a complete round of water levels will be measured synoptically at all wells. The procedure and schedule for synoptic water level measurements should be specified.

20. **Section 4.3, Sampling Methods:** The Work Plan should note the survey(s) to be conducted to avoid encountering subsurface utilities at the drilling locations.

21. **Section 4.3.1, Soil Boring Advancement:** Section 4.3.2.2 of the Work Plan specifies use of PFAS-compliant materials for well development. This section should specify that all materials, drill fluids and tooling lubricants used during drilling and well installation will be PFAS compliant.

22. **Section 4.3.2.1, Monitoring Wells:** This section of the SAP describes well installation procedures for the upper and lower sand wells. As noted in the Work Plan, the dividing clay layer that separates the upper and lower sand can be intermittent or thin in areas. The alternate well installation procedures to be used if the dividing clay layer is not encountered during drilling should be described. The SAP should state that EPA will be consulted prior to well construction.

23. **Section 4.3.3, Groundwater Monitoring Well Sampling Procedures, and SOP-2:** DNREC's Site Investigation and Restoration Section has been working on developing field sampling protocols for PFAS to help minimize possible sample contamination. They have been using the attached EPA NASA PFCs SOP. MassDEP and NHDES have also developed detailed PFAS collection guidance which may be helpful to review. Also attached for consideration is DNREC's Site Inspection Work Plan from May 2017 which includes PFAS sampling for the nearby New Castle Public Wells Groundwater Plume Site.

24. **Section 4.3.3.2, Low-Flow Groundwater Sampling Procedures:** As noted above, low-flow sampling may not be appropriate for all wells. Please submit the information requested above regarding stratigraphy and lithology and, also, well construction and well yield information for existing well locations.

25. **Section 4.3.3.2, Low-Flow Groundwater Sampling Procedures, first paragraph:** The SAP states that samples will be collected using Teflon-lined tubing (with the exception of the PFAS monitoring event). Section 4.3.2.2 of the SAP notes that HDPE tubing will be used during well development. It is recommended that any sampling events occurring before the PFAS sampling also be performed using HDPE tubing.

26. **Section 4.3.3.2, Low-Flow Groundwater Sampling Procedures:** The SAP states that during purging, field parameters will be monitored until the parameters stabilize based on three consecutive readings within specified ranges. Measurement of field parameters should not be made until at least one well volume, plus the volume of the sampling apparatus and tubing, has been removed.

27. **Section 4.3.3.2, Low-Flow Groundwater Sampling Procedures and Section 4.3.3.3, Volume Average Purging Using Bailers:** The procedure for filling VOC vials states, "If air bubbles are discovered, additional groundwater will be added to the vial until the bubbles are removed." If air bubbles are discovered, the sample vial should be discarded and a new sample should be collected, filling the entire bottle.

28. **Section 4.3.3.2, Low-Flow Groundwater Sampling Procedures:** The SAP states that "filtered (dissolved) metals samples will be collected by forcing groundwater through a 0.45-micron filter attached to the end of the discharge tubing." The samples should only be field filtered using an in-line 0.45-micron filter. However, the rationale for filtering the samples is unclear. The premise underlying the use of low-flow sampling is that particulates are not entrained and, therefore, there is no need to filter the sample for inorganic analysis. Only total metals should be taken for analysis when using low-flow sampling techniques.

29. **Section 4.3.3.3, Volume Average Purging Using Bailers:** Bailers should not be used to collect samples for analysis of VOCs and inorganics.

30. **Section 4.3.3.3, Volume Average Purging Using Bailers:** The SAP states, "If the well runs dry during purging, the pump will remain within screened interval and the groundwater in the well will be allowed to recharge to approximately 80 percent of its initial water level measurement prior to the restart of purging. This process will proceed until the 3 to 5 well volume removal criteria is accomplished. Water
quality parameters will be recorded in the same manner as described above." Under no circumstances should a well be purged to dryness. For wells which recover slowly, the water level should be drawn down and allowed to recover three times. As soon as the well has recovered sufficiently to sample, samples should be collected immediately.

31. **Section 4.3.3.3, Volume Average Purging Using Bailers:** The SAP states the following: "The filtered metals sample will be collected by attaching the filter to the end of the bailer and allowing the sample to gravity feed from the bailer into the sample bottle. Alternatively, the sample to be filtered will be placed in a FF-8200 transfer vessel (or equivalent) and filtered prior to placement in the sample bottle. Each sample collected for filtered metals analysis will be poured from the bailer into a transfer vessel and forced through a 0.45-micron filter prior to placement into the sample bottle. The sample will be forced through the filter using a hand pump or pressurized nitrogen." Under no conditions should the filtering procedures described here occur. Please see comments regarding filtering, above.

32. **Section 4.4.1, PFAS Decontamination:** Deionized water and methanol used for PFAS decontamination must be certified to be PFAS free. The use of Ziploc® storage bags to store equipment where the equipment comes in direct contact with the bag has the potential to transfer PFAS to sampling equipment. It would be impossible to know if this is an issue without first analyzing the Ziploc® bags.

33. **Section 4.4.4, Groundwater Sampling Equipment:** Section 4.4.1 of the SAP includes a separate decontamination procedure for PFAS equipment. Procedures for decontaminating non-dedicated submersible pumps for PFAS sampling should be included in this section. Deionized water and other solvents used for decontamination need to be certified as PFAS free.

34. **Section 4.8, Quality Control, second paragraph:** As discussed in Section 3.2 of SOP-3, deionized water blank(s) should be collected during PFAS sampling. This sample type and description should be added to Section 4.8 of the SAP and its subsections.

35. **Section 4.10.2, Photovac Microtip Photoionization Detector:** 1,2-dichlorethane has an ionization potential of 11.04 eV. The field crew should us an 11.7-eV lamp during soil screening to achieve the broadest VOC detection range.

Please call me at (215) 814-3228 if you have any questions or would like to discuss any of the comments.

Sincerely,

Debra Rossi
Remedial Project Manager
DE, VA, WV Remedial Branch

Attachments

cc: Christina Wirtz, DNREC
Joe DiNunzio, Artesian
Michele Ruth, Ruth Associates
Theresa Miller, Golder

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
Environmental Science Center
Office of Analytical Services and Quality Assurance
701 Mapes Road
Fort Meade, Maryland 20755-5350

DATE: April 13, 2018

SUBJECT: Army Creek Landfill Work Plan for Additional Investigation 02.14.2018 (DCN# 180060)

FROM: Aneesh Ghimire, QA Chemist *Aneesh Ghimire*
Technical Services Branch (3EA22)

THRU: Christian Matta, Acting Branch Chief
Technical Services Branch (3EA22)

TO: Debra Rossi, Remedial Project Manager
DE, VA, WV Remedial Branch (3HS23)

The Office of Analytical Services and Quality Assurance (OASQA) has completed review of the work plan prepared by Ruth Associates dated February 2018[(1)].

The following are a list of the comments and concerns:

Comments and Concerns:

1. A distribution list should be included in the SAP. A distribution list includes all individuals and their organizations who will receive copies of the approved QAPP and any subsequent revisions.

2. A project organization chart in this document is very short. It should go into detail and highlight individuals or organizations who are participating in the project with their responsibilities. (e.g., data users, decision-makers, project QA manager, subcontractors, etc. should be included). In addition, it should include EPA's role and other stakeholders/decision makers.

3. Individuals responsible for sampling operations and sampling QC should be identified. In addition, a third party is recommended for data validation which should be identified in the SAP/QAPP.

4. Potential migratory pathways should be included in the SAP/QAPP. If the SAP/QAPP does not have the required information and refers to a different document it should be included with the SAP/QAPP.

[1] Reviewed for compliance with EPA Requirements for Quality Assurance Project Plans, EPA QA/R5, March 2001

5. The DQOs for this project do not clearly identify the threshold or action levels. The DQO process is a seven-step process that provides guidance on developing data quality criteria and performance specifications for decision making. Please refer to the EPA's (QA/G-4) guidance document. DQOs should include decision statements using "If…then" to exemplify the actions taken if thresholds are exceeded. DQOs should elaborate on the specific analytical method, method's applicability and limitation for the data to meet. The SAP/QAPP should include a decision statement derived from the produced analytical data. The statement should be more precise, e.g. "If no detections are found, then no further action is needed".

6. DQO must include data usability, data acceptance criteria, project decisions and sampling conditions. For example: what actions are contemplated if analytical results are greater or lesser than project decision thresholds? What will be the next step or action?

7. The screening values must be specified and stated throughout the document. Emphasis needs to be placed on the "decision threshold" or action levels which will determine the applicability of the proposed analytical methods and their ability to achieve the necessary sensitivity for this sampling event. As part of the DQO process, the sampling event should have its sampling goals delineated. This will lead to having decision thresholds and resulting actions clearly described in the document as "If…Then" statements. The QAPP should define the potential consequences of decision errors (i.e., false positive error or false negative error) near the action level.

8. A project timetable including all deliverables with implementation and audit schedules should be provided in the QAPP. A table is recommended for this information.

9. Whenever a mass spectral analysis is requested using any SW-846 Methods, such as 8260B Volatiles, then it is important to request the testing laboratory to submit a Tentatively Identified Compound (TIC) list with each analysis. The TIC list can help identify organic unknows at the site that fall outside the Target Compound List.

10. The frequency and distribution of reports for results of periodic data quality assessments should be included in the SAP/QAPP. The frequency and distribution of reports for changes in the SAP/QAPP should be included. The QAPP should state revisions/updates (if applicable) which can be every 3-5 years.

11. OASQA is not recommending accepting any modifications to EPA Method 537. At this time, available information indicates the use of modified EPA Method 537 can, among other things, provide results that artificially suppress or enhance analyte concentrations reported as the result of using the modified analysis. This ultimately can result in the rejection of sample data. While EPA Method 537 is written for drinking water samples it has produced results of known quality with no

modifications necessary for groundwater samples collected at other Region III sites. OASQA would need to review the laboratories complete SOP for the analysis, in order to confidently assess whether or not laboratories modifications to the Method 537 would impact the accuracy of results.

If a modified EPA Method 537 is being used then modifications need to be described and additional data/information are needed such as the Standard Operating Procedure (SOP) from the lab (preferably in advance) and data to demonstrate the performance of the lab's method modifications on these matrices (demonstration of capability/method detection limit, performance testing, and quality control data). Alternatively, a draft direct inject method has produced performance data and Region 5 has developed a method which could be shared for a lab to follow. However, no modifications to the direct inject method would be acceptable.

12. OASQA highly recommends the collection of more than one field blank for PFAS due to their ubiquitous nature. One high-level field blank would reject all data from samples collected that day. Instead if many field blanks are collected at one each per sampling location then only the associated sample with the high-level blank would result in data being rejected.

13. Section 4.4.1 PFAS Decontamination. The use of Ziploc® storage bag to store equipment where the equipment comes in direct contact with the bag has the possibility to transfer PFAS to sampling equipment. It would be impossible to know if this is an issue without first analyzing the Ziploc® bags. If Ziploc® bags are used to store sample bottles during shipping this has no risk due to lack of direct contact.

14. Environmental Consultant (EC) and the Laboratory of choice should be documented before next submission of completed QAPP/SAP. In addition, QAPP/SAP should include the QAP and SOP for the laboratory.

Thank you for the opportunity to review this work plan. If you have any questions or comments, please do not hesitate to contact me at (410)305-2744, by email ghimire.aneesh@epa.gov or Christian Matta (Acting Technical Services Branch Chief) at matta.christian@epa.gov.